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ABSTRACT

This guide describes standard operating job procedures for the primary sedimentation process of wastewater treatment plants. The primary sedimentation process involves removing settleable and suspended solids, in part, from wastewater by gravitational forces, and scum and other floatable solids from wastewater by mechanical means. Step-by-step instructions are given for pre-start up procedures, start-up procedures, continuous operating procedures, and shut-down procedures, along with a description of the equipment used in the process and some theoretical information. (BB)

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# S.O.J.P.

**4**

**SOJP NO 4**

**PRIMARY SEDIMENTATION**

## A GUIDE FOR THE DEVELOPMENT OF

# STANDARD OPERATING JOB PROCEDURES

## FOR WASTE WATER TREATMENT PLANT UNIT OPERATIONS

**DEVELOPED BY**
**CHARLES COUNTY COMMUNITY COLLEGE**
**LA PLATA, MARYLAND**

**GRANT NO 900253**
**MANPOWER DEVELOPMENT STAFF,**
**ENVIRONMENTAL PROTECTION AGENCY.**

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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A GUIDE FOR DEVELOPING

STANDARD OPERATING JOB PROCEDURES

FOR THE

PRIMARY SEDIMENTATION
PROCESS
WASTEWATER TREATMENT FACILITY

SOJP NO 4

Developed by Charles County Community College under
a grant with the

Manpower and Training Staff
Office of Water Programs Operations
Environmental Protection Agency

Standard Operating Job Procedures for the PRIMARY SEDIMENTATION

This Process was developed by:

Name The entire staff of consultants

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Position

Education and Technical Background

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Position

Education and Technical Background

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PAGE NO 1

Process PRIMARY SEDIMENTATION

1. Operation Objectives

2. Brief Description of Process

## 1. Operation Objectives

The primary sedimentation process involves removing settleable and suspended solids, in part, from wastewater by gravitational forces, and scum and other floatable solids from wastewater by mechanical means.

## 2. Brief Description of Unit Operation

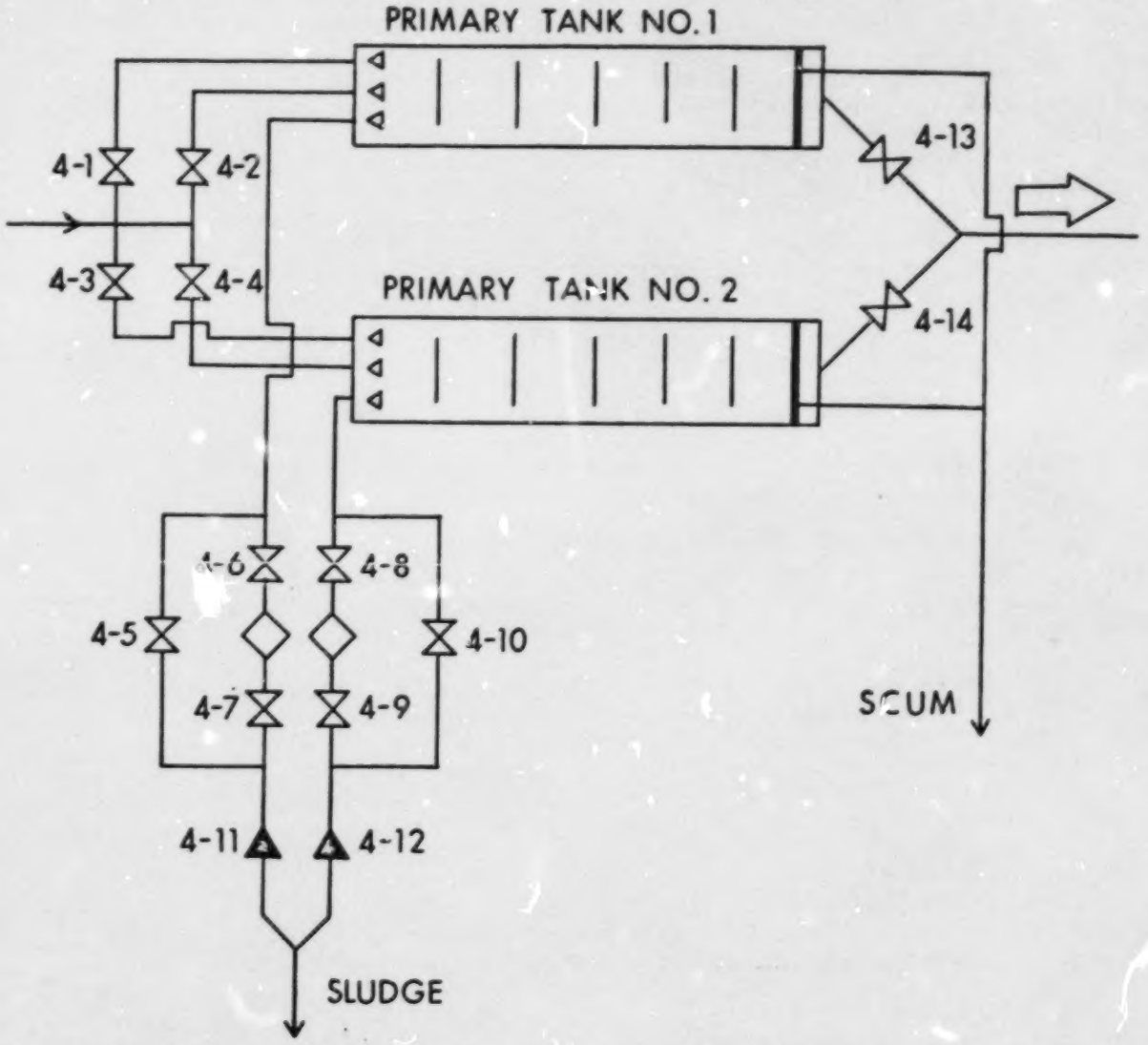
Raw wastewater enters the influent end of the sedimentation tank and virtually all velocity and energy of the flow are slowed and distributed by means of a baffle and the large surface area of the tank. This reduction in velocity allows the settleable material (sludge) to fall by gravity to the bottom of the tank and the floatable material (scum) to rise to the surface.

The sedimentation tank contains a continuous chain and flight mechanism which travels along the bottom of the tank and then is elevated on rails to travel on the surface. This mechanism scrapes the sludge along the bottom of the tank to a sludge hopper and pushes the scum floating on the surface to one end of the tank where it is discharged into a scum trough.

The sludge and scum obtained in this manner are pumped to other treatment units for further processing. The wastewater, which has had these solids removed, flows over a weir as effluent from this process and is further processed or disposed.

Process PRIMARY SEDIMENTATION

Flow Sheet



Process PRIMARY SEDIMENTATION

General Description of Equipment Used in the Process

The primary sedimentation process unit consists of two concrete tanks; each is approximately 40 feet wide and 155 feet long and has a water depth of 9 feet. Wastewater is admitted to each tank through an influent gate and exits over an effluent weir. The influent end of the tank is equipped with a baffle to evenly distribute the incoming flow across the entire width of the tank. The effluent end of the tank is equipped with a scum trough and baffle located ahead of the effluent weir to prevent the exit of floating material in the effluent.

Each tank is equipped with a series of sludge scrapers consisting of wooden flights which are the width of the tank fastened to a continuous chain and drive mechanism. These flights move along the surface of the wastewater from the influent to the effluent end of the tank and carry the floating material toward the scum trough at the effluent end. The flights then move to the bottom of the tank, scrape toward the influent end, and push all settled solids into a cross-channel hopper. The cross-channel hopper is equipped with its own set of flights which move the sludge to a smaller hopper from which the sludge is drawn off. The flights are operated by a drive mechanism consisting of an electric motor, a gear reduction unit, and drive sprockets. Each drive unit is equipped with its own motor starting controls located on a panel near the drive unit.

Scum is removed from the tank by rotating a slotted pipe (scum trough) toward the scum so that it is carried into a pipe by the inrushing water. The scum trough is connected to a scum pit where the scum is stored. The scum is pumped from the scum pit to disposal.

Sludge is withdrawn from the small sludge hopper by means of a telescopic valve attached to each tank. A hand wheel is turned to lower each telescopic valve to a level where the hydrostatic pressure developed by the water level in the primary sedimentation tank forces the sludge from the sludge hopper through the telescopic valve to the sludge storage tank. The sludge is pumped from the sludge storage tank to disposal.

A nuclear density gauge, inserted in the sludge line, measures the concentration of sludge solids on a continuous basis so that a maximum concentration of solids is obtained. The nuclear density gauge consists of a source of radioactive material located on one side of the pipe and a radiation detection device located on the other side of the pipe and a radiation detection amplifier. The percentage of solids is displayed on an indicating meter.

Each tank is equipped with drain lines so that it can be dewatered when necessary for corrective and preventive maintenance.

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| OPERATING PROCEDURES | STEP SEQUENCE | INFORMATION/OPERATING GOALS/SPECIFICATIONS | TRAINING GUIDE NOTE |
|---|---|---|---|
| A. PRESTART-UP PROCEDURES | | | |
| 1. Safety Inspection | 1. Lock out and tag all circuit breakers. | 1. To prevent electrical shock and damage to personnel and/or equipment. | XI[illegible]1, XII-2 |
| | 2. Close influent and effluent gates. | | |
| 2. Structure Inspection | 1. Inspect influent structure. | 1. Remove all debris. | |
| | | 2. Make certain that sluice gates are properly seated. | |
| | 2. Inspect effluent structure. | 1. Remove all debris. | |
| | | 2. Make certain that sluice gates are properly seated. | |
| | 3. Inspect tank. | 1. Remove all debris; pay particular attention to sludge hopper. | |
| | | 2. Assure that tank is level. | |
| | | 3. Assure that tank is dry. | |
| | | 4. Check for cracks and leaking joints. | |
| 3. Equipment Inspection | 1. Inspect drive chain. | 1. Assure proper tension. | V-1, VII-3 |
| | | 2. Assure all pins are in chain, check for wear. | |

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|---|---|---|---|
| | | 3. Check lubrication. | IX-1 |
| | 2. Inspect sprockets. | 1. Assure proper alignment. | V-1, VII-3 |
| | | 2. Check tooth condition for wear. | |
| | | 3. Check sprocket bearings for lubrication. | IX-1 |
| | 3. Inspect rails. | 1. Assure proper alignment. | V-1, VII-4 |
| | | 2. Check tightness. | |
| | | 3. Check lubrication. | IX-1 |
| | | 4. Check rail condition for wear. | |
| | 4. Inspect flights. | 1. Check to determine if all are in place and properly bolted. | V-1, VII-4 |
| | | 2. Check for wear and cracks. | IX-1 |
| | | 3. Check shoes for wear and proper fitting. | |
| | 5. Inspect drive unit. | | V-1, VII-1 IX-1 |
| | 1. Inspect gear reduction units. | 1. Check for tightness and alignment. | |
| | 2. Inspect couplings. | 2. Check lubrication. | |
| | 3. Inspect shearface. | 1. Assure it is greased and free. | |

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|---|---|---|---|
| | 4. Inspect shearpin. | 1. Assure it is placed properly. | |
| | | 2. Lubricate. | |
| | 5. Inspect counter shaft bearings. | 1. Assure it is lubricated. | |
| | 6. Inspect motor shaft. | 1. Spin by hand to assure it freely turns. | VII-2 |
| | 7. Check electrical switch gear for proper nomenclature and operation. | 1. Refer to equipment maintenance record. | VII-6 |
| | | 2. Check overload heaters for proper sizing. | |
| | | 3. Measure voltage at all contact points to motor disconnect. | |
| | | 4. Make certain overload protection is adequate. | VII-6 |
| | 8. Check drive unit for proper rotation. | 1. Motor rotation should match rotation marks on motor housing. | |
| | 6. Inspect scum trough. | 1. Assure lubrication. | V-1, IX-1 |
| | | 2. Check to be sure it is operable. | VII-5 |
| | | 3. Assure it is clean and clear. | |
| | 7. Inspect scum pump. | 1. Refer to pumping and piping SOJP. | V-1 |
| | 8. Inspect telescopic valve. | 1. Assure it is operable. | V-1,VII-7 |

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|---|---|---|---|
| | | 2. Assure lubrication. | IX-1 |
| | 9, Inspect sludge well. | 1. Assure it is clean and clear. | |
| | 10. Inspect sludge pump. | 1. Refer to pumping and piping SOJP. | V-1 |
| | 11. Inspect density meter. | 1. Check calibration. | V-1, VII-8 |
| | | 2. Assure it is clean. | IX-1 |
| | 12. Inspect weirs. | 1. Assure they are level. | V-1, IX-1 |
| | | 2. Assure bolts are tight. | |

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| OPERATING PROCEDURES | STEP SEQUENCE | INFORMATION/OPERATING GOALS/SPECIFICATIONS | TRAINING GUIDE NOTE |
|---|---|---|---|
| B. START UP OPERATION | | | I-1, II-1 III-1 |
| 1. Start Equipment and Fill Tank | 1. Assure all personnel and their equipment are out of tanks. | | IV-1, XII-1, XIII-1 |
| | 2. Remove tags and turn power on. | | |
| | 3. Remove tags and open influent gates 1/4 of the way. | 1. Do not open gate any wider as pressure of water flow may harm baffle. | |
| | 4. Remove tag and open effluent gate. | | |
| | 5. Open drain line check for proper operation and then close valve. | 1. Perform while unit is filling. | |
| | 6. Start chain and flights. | 1. Chain must be submerged before starting operation.<br>2. Check to see if operating correctly, look for vibration in motors, couplings, and drive assembly. | |
| | 7. Turn off chain and flights. | | |

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|---|---|---|---|
| | 8. Open influent gates for even distribution of flow between tanks. | | |
| | 9. Check telescopic valve. | 1. Be sure valve is not binding and moves freely. | |
| | 10. Adjust baffles for even flow distribution and effluent weirs for uniform overflow rates. | 1. Assure overflow is even. | |
| | 11. Start flight drive. | | |
| | 12. Check flight height. | 1. Flights should extend 2 inches above water level at peak flow rate. | |
| | 13. Check sludge drawoff line for proper operation by opening the gate valve in the line and lowering the telescopic valve until water just flows. | | |
| | 14. Turn on sludge density meter and check calibration. | 1. Refer to sludge density meter O & M Manual. | VII-8 |

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|---|---|---|---|
| | 15. Turn on sludge pump power. | 1. Check pumping. | |
| | 16. Start timer and adjust. | 1. Compute time by composite samples of influent and effluent for suspended solids content. | |
| 2. Check Equipment | 1. Check operation every 30 minutes for first 3 hours. | 1. Assure gear mechanism, motor, chain drive, flights and chains and all associated equipment are operating properly. | |
| 3. Sample and Analyze Flow | 1. Draw small amount of sludge. After process has beenn in operation for 2 hours. | 1. Observe sludge samples for grit, color, odor, settleability. | X-1, VI-1 |

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| OPERATING PROCEDURES | STEP SEQUENCE | INFORMATION/OPERATING GOALS/SPECIFICATIONS | TRAINING GUIDE NOTE |
|---|---|---|---|
| C. CONTINUOUS OPERATING PROCEDURES | | | |
| 1. Check Process (every 2 hrs) | 1. Check drive unit for proper operation.<br>2. Observe movement of flights for proper motion.<br>3. Observe liquid in tank for signs of rising gas bubbles or sludge solids.<br>4. Adjust telescopic valve to maintain sludge concentration at a level greater than 3% but less than 8%.<br>5. Collect influent and effluent samples for flow weighted compositing. | | |
| 2. Sample and Analysis of Unit Influent and Effluent Flow | 1. Analyze Sample. | 1. Normal result<br>BOD removal 30-40%<br>SS removal 70-90% | VI-1, X-1 |

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|---|---|---|---|
| 3. Process Adjustments | 1. Adjust unit operations to control the following operating conditions. | | IV-1, IV-2<br>VIII-1<br>VIII-2 |
| | 1. Rising gas bubbles and sludge solids. | 1. Rising gas bubbles or sludge solids are an indicator of septic sludge. This may arise from:<br>(1) Septic waste reaching plant<br>(2) Inadequate sludge withdrawal<br>(3) Inoperative collector mechanism | VIII-1<br>VII-1<br>VII-2<br>VII-6 |
| | 2. Sludge withdrawal. | 1. Withdrawal of too thin a sludge will be detrimental to the sludge disposal system by overloading it hydraulically. Too thick a sludge will make pumping difficult and could result in clogged lines. | |
| | 3. Cold weather operation. | 1. On two-hour check, make sure ice is not forming in the tank or in the skimming trough. This will only happen under the coldest of conditions. If ice is a problem, it should be broken up with picks or axes. This will prevent jamming of the flights and scrapers. Prior to the first freeze, check to determine if insulation and heaters on all exposed piping are in good condition. | |

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|---|---|---|---|
| | 4. Variations in plant flow. | 1. The character of settleable solids and the ratio between volatile and nonvolatile settleable solids will vary under periods of high stormwater infiltration as compared to periods of normal plant operation.<br>2. Conditions will vary from plant to plant depending upong the sewage collection systems served. | VIII-3 |
| 4. Daily Housekeeping | 1. Hose down and generally clean up weirs, walls, and scum troughs. | | IX-2 |
| 5. Reports | 1. Log all observations and process changes. | | XIII-1 |
| | 2. Log all laboratory test results. | | XIII-1 |

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| D. SHUTDOWN PROCEDURES | | | |
| 1. Stop Flow | 1. Close influent gate. | 1. Log all process changes.<br>2. Notify other operators of shut down. | XIII-1<br>IV-1, IV-2 |
| 2. Go to Manual Operation | 1. Operate chain and flights. | 1. Assure all sludge and scum are removed from the unit. | |
| | 2. Turn off sludge pump. | | |
| | 3. Turn off chain and flights. | | |
| 3. Empty Tank | 1. Open drain valves. | | |
| 4. Clean Tank and Equipment | 1. Hose down tank and all internal structures while draining. | 1. Do not wait until the tank is empty, since the material will be dry and difficult to remove. | |
| | 2. Close effluent gate. | | |
| 5. Shut Down Equipment | 1. Lock out circuit breakers. | | XII-2 |
| 6. Preventive Maintenance | 1. Protect chain and flights from rust and corrosion. | 1. Coat chain, rails, and all submerged metal parts if unit is to be shut down for one month or more. | |

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|---|---|---|---|
| E. PREVENTIVE MAINTENANCE | | MAY BE DONE BY OTHERS | IX-2 |
| 1. Lubrication | 1. Lubricate influent gate operating mechanism. | 1. See lubrication schedule for proper interval and lubricant. | IX-1<br>XIII-1 |
| | 2. Lubricate collector drive bearing. | 1. Same as above. | |
| | 3. Lubricate gear reduction unit. | 1. Same as above. | |
| | 4. Lubricate motor. | 1. Same as above. | |
| | 5. Lubricate counter-shaft bearings. | 1. Weekly. | |
| | 6. Lubricate drive chain. | 1. Weekly. | |
| | 7. Lubricate shearface. | 1. Monthly. | |
| | 8. Lubricate coupling. | 1. Annually. | |
| 2. Inspect Equipment | 1. Check motor electrically. | 1. Annually.<br>2. Record voltage, amperage, and insulation resistance. | VII-1,IX-1<br>XIII-1 |
| | 2. Inspect switch gear. | 1. Annually.<br>2. Record condition. | VII-6,IX-1<br>XIII-1 |

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| OPERATING PROCEDURES | STEP SEQUENCE | INFORMATION/OPERATING GOALS/SPECIFICATIONS | TRAINING GUIDE NOTE |
|---|---|---|---|
| | 3. Calibrate nuclear density gauge. | 1. Use manufacturer's O & M manual. | VII-8,IX-1 XIII-1 |
| | 4. Dewater tanks and inspect mechanical equipment. | 1. Annually | VII-1,IX-1 XIII-1 |
| | 5. Check chain, flights, and rails. | 1. This should be when tank is drained. | VII-3,IX-1 XIII-1 |
| 3. Maintain Records | 1. Record all maintenance data. | | XIII-1 |

## TRAINING GUIDE

| SECTION | TOPIC |
|---|---|
| I | Operating Theory |
| II | Educational Concepts - Mathematics |
| III | Educational Concepts - Science |
| IV | Educational Concepts - Communications |
| V | Process Equipment |
| VI | Process Flow - Characterization |
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| VIII | Abnormal Operations - Trouble Shooting |
| IX | Maintenance Practices |
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| XI | Instrumentation - Automation |
| XII | Safety Practices |
| XIII | Records Reports |

OPERATING THEORY

| TRAINING GUIDE NOTE | TRAINING INFO: THEORY/CONCEPTS/CALCULATIONS/ TECHNIQUES | REFERENCES/INSTRUCTIONAL RESOURCES |
|---|---|---|
| I-1<br>[B] | 1. Concepts of the following:<br>a. Overflow rates<br>b. Weir loading<br>c. Turbulence<br>d. Short-circuiting<br>e. Infiltration in collection system<br>f. Daily, weekly, or yearly flow variation | New York Manual pp. 631-642<br>Texas Manual Ch. 11, pp 190-201 (also refs.1-4, pg. 201) |

| TRAINING GUIDE NOTE | TRAINING INFO: THEORY/CONCEPTS/CALCULATIONS/ TECHNIQUES | REFERENCES/INSTRUCTIONAL RESOURCES |
|---|---|---|
| II-1 [B] | 1. Basic Concepts<br><br>Addition, subtraction, multiplication, division, fractions, ratios, decimal points, and percentages, conversion from one set of units to another and basic calculations.<br><br>Concept of the mass balance around any given unit. | Texas Manual pp. 572-590<br><br>Elementary Mathematics & Basic Calculations. Scranton Gillette Publications: Chicago<br><br>WPCF #18<br><br>Manual of Instruction for Sewage Treatment Plant Operators: pp 41-42<br><br>NY State Manual |
| | 2. Specific Formulae<br><br>a. Detention Time $D_T$ = $\frac{\text{Tank volume (gal) x 24 hr/day}}{\text{Flow rate (gal/day)}}$<br><br>b. Volume (gal) = Length x Width x Depth x 7.48 gal/cu. ft.<br><br>c. Treatment Efficiency (%) = $\frac{\text{[Influent conc. - Effluent conc.x100]}}{\text{Influent Concentration}}$<br><br>d. Weir rate = $\frac{\text{Flow (gpd)}}{\text{Weir length (ft)}}$<br><br>e. Surface Settling Rate = $\frac{\text{Flow (gpd)}}{\text{Length (ft) x Width (ft)}}$<br><br>f. Loading Rate = Flow (mgd) x Conc. (mg/l) x 8.34 lbs/gal (lbs/day) | |
| | 3. Example Problems | California WPCA Workbook Mathematics for Sewage Plant Operators: pp V 1-48 |

EDUCATIONAL CONCEPTS -- SCIENCE

| TRAINING GUIDE NOTE | TRAINING INFO: THEORY/CONCEPTS/CALCULATIONS/ TECHNIQUES | REFERENCES/INSTRUCTIONAL RESOURCES |
|---|---|---|
| III-1 [B] | 1. Concepts of the following:<br>a. Density and specific gravity<br>b. Basic electricity-concepts of voltage and current-basic motor wiring, etc.<br>c. Basic hydraulics-some on pumps to includge pressure, flow, impeller types, TDH, etc. | Manual of Instruction for Sewage Treatment Plant Operators pp 31, 37-43<br>WPCF MOP #11 Ch. 6<br>WPCF MOP #8, Section 8.1 and 8.2<br>WPCF #14 Ch. 8<br>WPCF #18 |

EDUCATIONAL CONCEPTS -- COMMUNICATIONS

| TRAINING GUIDE NOTE | TRAINING INFO: THEORY/CONCEPTS/CALCULATIONS/ TECHNIQUES | REFERENCES/INSTRUCTIONAL RESOURCES |
|---|---|---|
| IV-1 | 1. Operator to operator communications | |
| [B.1.1] [C.3.1] [D.1.12] | a. Present flow characteristics | |
| | b. Process changes deviating from normal operation. | |
| | c. Anticipated problem areas to be watched. | |
| IV-2 | 2. Operator to supervisor communications | |
| [B.1.1] [C.3.1] [D.1.1.2] | a. Summary operation reports | |
| | b. Reports on abnormal conditions | |
| | c. Equipment and operational supply needs. | |

PROCESS EQUIPMENT

| TRAINING GUIDE NOTE | TRAINING INFO: THEORY/CONCEPTS/CALCULATIONS/ TECHNIQUES | REFERENCES/INSTRUCTIONAL RESOURCES |
|---|---|---|
| V-1 [A.3.1.1] [A.3.2.1] [A.3.3.1] [A.3.4.1] [A.3.5] [A.3.6.1] [A.3.7.1] [A.3.8.1] [A.3.9.1] [A.3.10.1] [A.3.11.1] [A.3.12.1] | 1. Equipment Inspection - Frequency | |
| | a. Sluice Gates | every 4 hours |
| | b. Motor (Flight Drive) | every 8 hours |
| | c. Clutch | every hour |
| | d. Gearbox | every 8 hours |
| | e. Sprocket | every 8 hours |
| | f. Chain | every hour |
| | g. Flights | every hour |
| | h. Skimmer Trough | every 4 hours |
| | i. Baffles | every 4 hours |
| | j. Weirs | every 8 hours |
| | k. Telescopic Valve | every 8 hours |
| | l. Sludge Well | every hour |
| | m. Grease Pit | every four hours |
| | n. Motor (Pump) | every 8 hours |
| | o. Variable Speed Drive | every hour |
| | p. Pumps (Piston type-belt driven) | every 4 hours |
| | q. Valves | every 4 hours |
| | r. Piping | every 8 hours |
| | s. Time Clock | every 8 hours |
| | t. Density Meter | every hour |
| | u. Limit Switch | every 8 hours |
| | v. First Aid Kit | every 8 hours |
| | w. Fire Fighting Equipment | every 8 hours |
| | x. Effluent Sampling | every 2 hours |
| | y. Influent Sampling | every 2 hours |

PROCESS FLOW -- CHARACTERIZATION

| TRAINING GUIDE NOTE | TRAINING INFO: THEORY/CONCEPTS/CALCULATIONS/ TECHNIQUES | REFERENCES/INSTRUCTIONAL RESOURCES |
|---|---|---|
| VI-1 [B.3.1.1] [C.2.1.1] | 1. Normal influent physical and chemical characteristics. | WPCF #14 pp 8-11 |
| | 2. Normal effluent physical characteristics | |
| | 3. Normal sludge physical characteristics | WPCF #1 p.33 |
| | 4. 99.9% of sewage is water! | |
| | 5. Normal domestic (raw) sewage may be as follows:<br>a. 50% volatile total solids<br>b. 200 mg/l to 300 mg/l SS of which 70% to 80% are volatile<br>c. 80 to 130 gal. of sewage/capita/day | Texas Manual |

PROCESS CONTROL

| TRAINING GUIDE NOTE | TRAINING INFO: THEORY/CONCEPTS/CALCULATIONS/ TECHNIQUES | REFERENCES/INSTRUCTIONAL RESOURCES |
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| VII-1<br>[A.3.5]<br>[C.3.1.1]<br>[E.2.1.1]<br>[E.3.1] | 1. Collector Drive Unit | A, B, C |
| VII-2<br>[A.3.5.6.1]<br>[C.3.1.1.1] | 2. Collector Drive Unit Motor | A, C |
| VII-3<br>[A.3.1.1]<br>[A.3.2.1]<br>[E.2.5.1] | 3. Chains, Sprockets, and Shafts | A, B, C |
| VII-4<br>[A.3.3.1]<br>[A.3.4.1] | 4. Rails and Flights | A, B |
| VII-5<br>[A.3.6.2] | 5. Skimming Mechanism | A, B |
| VII-6<br>[A.3.5.7.1]<br>[A.3.5.7.4]<br>[C.3.1.1]<br>[E.2.2.1] | 6. Collector Drive Unit Switchgear | A, B, C |
| VII-7<br>[A.3.8.1] | 7. Telescopic Valves | A, B, C |
| VII-8<br>[A.3.11.1]<br>[B.14.1]<br>[D.2.3.1] | 8. Nuclear Density Gauge | References:<br>A. Shop Drawings<br>B. Blueprints<br>C. Manufacturer's O & M Manual |

ABNORMAL OPERATION--TROUBLE SHOOTING

| TRAINING GUIDE NOTE | TRAINING INFO: THEORY/CONCEPTS/CALCULATIONS/ TECHNIQUES | REFERENCES/INSTRUCTIONAL RESOURCES |
|---|---|---|
| VIII-1 [C.3.1] [C.3.1.1.1] | Abnormal Effluent Characteristics and Probable Operational Causes<br>1. Color<br>a. Black: Seen by operator<br>CAUSE<br>(1) Waste has turned septic because of:<br>a. low flow in collection system.<br>b. high temperature.<br>c. extended stay in collection system.<br>d. toxic materials introduced into collection system.<br>b. Any color not normal for a particular plant (determined by entries of abnormalities in plant operations log): seen by operator.<br>CAUSE: unusual industrial waste being introduced into collection system.<br>2. Odor<br>a. Scent like rotten eggs: smelled by operator.<br>CAUSE:<br>(1) Waste has turned septic, thereby generating $H_2S$ because of:<br>a. low flow in collection system<br>b. its high temperature<br>c. shock load of toxic materials introduced into collection system.<br>b. Scent like petroleum products: smelled by operator.<br>CAUSE: dumping of petroleum products (gas, oil, kerosene, etc.) by industry and business (service stations, etc.) | |